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Prevalence of Hepatitis B virus and Hepatitis C virus among prison inmates in Istanbul, Turkey

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Abstract

Aim: Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are major contributors to liver disease and can cause chronic hepatitis, cirrhosis and hepatocellular carcinoma. In Turkey prisons, the prevalence of HBV and HCV is not known. The objective of this study was to determine the seroprevalence of HBV and HCV in prison inmates and wardens in Turkey.

Material and Methods: A questionnaire form including questions about demographics, place of living, educational status, monthly income before prisoned, smoking and alcohol use, use of drugs and pleasure-inducing substance, intravenous drug abuse, tattooing, razors, nail clippers, toothbrushes shared with other inmates, sexual preference, condom use and a history blood transfusion was applied. Participants were tested for their HbsAg and HCV status.

Results: A total of 520 male participants were included in the study. HBV virus was detected in 24 (4.82%) inmates and HCV virus in 2 (0.4%) inmates. No statistically significant difference was found between the participants with and without hepatitis in terms of age, marital status, place of living, income before prisoned, and educational status (for all $p>0.05$). The rate of intravenous drug use was statistically significantly higher in HBV positive and HCV positive groups ($p<0.05$).

Discussion: Our results indicate that the serorevalence of HBV and HCV among prisoners was similar to the general population. Training on appropriate behavioral patterns, performing required health screening, and improving conditions in prisons are important not only for individual health but also for public health.

Keywords

HBV, HCV, Seroprevalence, Risky Behavior, Prison, Inmate

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Introduction

Hepatitis B virus (HBV) is a major cause of liver disease and can cause chronic hepatitis, cirrhosis, and hepatocellular carcinoma; therefore, it is one of the most important global health problems [1]. According to the World Health Organization (WHO), in 2015, the global prevalence of HBV infection in the general population was 3.5%. In Turkey, the prevalence of HBV has been reported as 4.57% in 2018. Accordingly, 3.3 million people are infected with HBV in our country.

Hepatitis C virus (HCV) is the main contributor to chronic liver disease worldwide. HCV infection is associated with acute and chronic hepatitis and liver cancer [2]. According to the WHO, in 2015, 71 million persons were living with chronic HCV infection worldwide with a global prevalence of 1% and 399 000 died from cirrhosis or hepatocellular carcinoma. The prevalence of HCV in our country has been reported as 1.15% in the general population [3].

Both infections are transmitted both parenterally and sexually, most often through mucous membrane exposure or percutaneous exposure to infectious body fluids. Risk groups for the two pathogens include healthcare providers, sexually active individuals, men who have sex with men, illicit drug users, dialysis patients, prison inmates and all pregnant women. In Turkey, the seroprevalence among risky groups such as dialysis patients, sex workers and healthcare professionals has been studied previously [4].

Prisons are potential locations for transmission of HBV and HCV infections, and prison inmates are among the risky groups. Crime rates and therefore the number of detainees and prisoners are gradually increasing. According to the statistics of the Ministry of Justice, the number of detainees and prisoners as of 30/6/2021 is 287.094. Prison occupancy rate is 100% depending on the city. There are studies on HBV and HCV prevalence of inmates in prisons abroad; but in Turkey, the prevalence of HBV and HCV is not known. Therefore, the objective of this study was to determine the seroprevalence of HBV and HCV in prison inmates and wardens in Turkey.

Material and Methods

Before the beginning, the study protocol was approved by the Ministry of Justice, General Directorate of Prisons and Detention Houses with the number B.03.0.CTE.09.204.06.01-3706/151485 and 29/12/2010 dated permission and by the local ethics committee of our hospital (decision number 29 and dated 15/12/2011). All participants were informed about the objectives of the study, read the participation forms and gave written consent. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

In this cross-sectional study, the seroprevalence of HBV and HCV was investigated among prison inmates and wardens in Kartal and Maltepe Penal Institutions between January 2012 and October 2012. A questionnaire form prepared by the researchers in line with the relevant literature was conducted. The study was conducted on a volunteer basis.

The questionnaire form included demographics, place of residence, educational status, monthly income before prisoned, smoking and alcohol use, use of drugs and pleasure-inducing substances, intravenous drug abuse, tattooing, razors, nail clippers, toothbrushes shared with other inmates, sexual preference, condom use and a history of blood transfusion.

Five mL of blood samples were collected from the participants. Serum samples were stored at -80 °C until the day of analysis. All serum samples were analyzed for HBsAg and anti-HCV.

HBsAg was studied with third-generation RADIM enzyme immunoassay (EIA) (DIA.PRO, Italy) testing method. The HBsAg analysis was performed according to the manufacturing company's instructions. Blood samples from subjects who have a minimum positive value, over positive value, or an intermediate value were studied a second time to verify the positivity of HBsAg. Intermediate results were confirmed with Liason (Dia-Sorin, Saluggia, Italy).

Anti-HCV was studied with RADIM EIA (DIA.PRO, Italy). Analyses were performed according to the manufacturing company's instructions. Blood samples from subjects who have a minimum positive value, over positive value, or an intermediate value, were studied a second time to verify the positivity of HBsAg. Samples with an intermediate value were confirmed with Inno-Lia (INNO-LIA, HCV Score, Innogenetics, Belgium), a third-generation Line Immune Assay (LIA) testing method. HCV-RNA was reconfirmed, because it showed results with an intermediate value again.

Statistical Analysis

Data obtained in the study were statistically analyzed using SPSS version 20.0 (Statistical Package for Social Sciences, IBM Inc., Armonk, NY, USA) package software. Mean, standard deviation, frequency and percentage values were used in descriptive statistics of the data. ANOVA test was used in the analysis of quantitative data. The Chi Square test was used in the analysis of the qualitative data; when the Chi Square test's conditions were not satisfied, Fischer Exact test was used. The p values <0.05 were considered statistically significant.

Results

A total of 520 male participants were included in the study. All participants were over 18 years of ageж 495 (95.2%) of all participants were inmates and 25 (4.8%) were wardens. The mean age of the participants was 31±10.35 (min-max: 18-71) years.

HBV virus was detected in 24 (4.82%) inmates and HCV virus in 2 (0.4%) inmates. None of the wardens had HBV and/or HCV. No statistically significant difference was found between the participants with and without hepatitis in terms of age, marital status, place of living, income before prisoned, and educational status (for all $p>0.05$). The demographic characteristics of the participants are shown in Table 1.

Risky behaviors of the participants were evaluated. Accordingly, the participants were divided into three groups as negative, HBV positive and HCV positive. Results of the questionnaire are given in Table 2. No statistically significant difference was found between the groups in terms of the rates of smoking, alcohol consumption, drug use, sexual preference, unprotected sexual intercourse, tattooing, tattooing in the prison, razor blade sharing, nail clippers sharing and toothbrush sharing (for all $p>0.05$). The rate of intravenous drug use was statistically significantly higher in the HBV positive and HCV positive groups compared to the negative group ($p<0.05$).

Table 1. Demographic characteristics of the participants

		Hepatitis marker Negative		HBV (+)		HCV (+)		p
Mean age	18-71	31±10.4		31,3±9.3		39±4.2		p>0.05
Marital status	Single	293	59.30%	14	58.30%	1	50%	p>0.05
	Married	175	35.40%	10	41.70%	1	50%	
	Divorced but extramarital relationship	26	5.30%	0	0%	0	0%	
Place of living	Istanbul	443	89.70%	20	83.30%	2	100%	p>0.05
	Outside of Istanbul	48	9.70%	4	16.70%	0	0%	
	Abroad	3	0.60%	0	0%	0	0%	
Income before prison	No income	123	24.90%	6	25%	0	0%	p>0.05
	≤1000 ₺	136	27.50%	7	29.20%	0	0%	
	1000-2000 ₺	180	36.40%	7	29.20%	1	50%	
	2000-5000 ₺	36	7.30%	3	12.50%	1	50%	
	≥5000 ₺	19	3.80%	1	4.20%	0	0%	
Educational status	Illiterate	49	9.90%	1	4.20%	0	0%	p>0.05
	Primary school	154	31.20%	10	41.70%	0	0%	
	Middle school	152	30.80%	8	33.30%	2	100%	
	High school	108	21.90%	4	16.70%	0	0%	
	University	31	5.70%	1	4.20%	0	0%	

Table 2. Risky behaviours of the participants

		Hepatitis marker Negative		HBV (+)		HCV (+)		p
Smoking	No	86	17.40%	4	16.70%	0	0%	p>0.05
	Yes	375	75.90%	18	75%	2	100%	
	Ex-smoker	33	6.70%	2	8.30%	0	0%	
Alcohol use	No	231	46.90%	13	54.20%	0	0%	p>0.05
	Yes	261	52.90%	11	45.80%	2	100%	
	Ex- user	1	0.20%	0	0%	0	0%	
Drug use	Yes	226	45.70%	10	41.70%	2	100%	p>0.05
	No	268	54.30%	14	58.30%	0	0%	
IV drug use	Yes	15	3%	2	8.30%	2	100%	p<0.05
	No	479	97%	22	91.70%	0	0%	
Sexual preference	No sexual experience	12	2.40%	1	4.20%	0	0%	p>0.05
	Monogaous sexual life	341	69%	18	75%	1	50%	
	Multipartner	138	27.90%	5	20.80%	1	50%	
	Homosexual	3	0.60%	0	0%	0	0%	
Unprotected sex	No	173	35%	6	25%	0	0%	p>0.05
	Yes	321	65%	18	75%	2	100%	
Tattooing	No	305	61.70%	12	50%	1	50%	p>0.05
	Yes	189	38.30%	12	50%	1	50%	
Tattooing in prison	I get a tattoo here for the first time.	77	21.70%	2	37.50%	0	50%	p>0.05
	I have already a tattoo.	107	21.70%	9	37.50%	1	50%	
	I have already a tattoo and I get a tattoo here as well.	5	1%	1	4.20%	0	0%	
Razor blade sharing	Yes	47	9.50%	1	4.20%	0	0%	p>0.05
	No	447	90.50%	23	95.80%	2	100%	
Nail clippers sharing	Yes	113	22.90%	4	16.70%	1	50%	p>0.05
	No	381	77.10%	20	83.30%	1	50%	
Toothbrush sharing	Yes	15	3%	1	4.20%	0	0%	p>0.05
	No	479	97%	23	95.80%	2	100%	

Discussion

HBV and HCV seroprevalence studies conducted in Turkey included risk groups such as people living in nursing homes, healthcare professionals who are in close contact with blood and blood products and dialysis patients [5-7]. However, there is no study published in Turkey on places where people live together such as prisons where there are plenty of commonly used areas. Prisoners worldwide have an increased prevalence of HBV and HCV compared to the general population [8]. A complex interaction of individual, social, and environmental factors before, during, and after imprisonment results in an increased risk of these infections and diseases in prison

inmates. This study is the first conducted on this subject in Turkey.

The high prevalence of HIV, HBV, HCV and other sexually transmitted diseases have been attributed to unprotected sexual relationships, high-risk partners, intravenous drug use and shared syringe [9]. In several studies conducted in prisons, syphilis was found in 8%, chlamydia in 8.7%, gonorrhea in 32%, HIV in 13%, and HCV in 20% of the inmates [10, 11]. It was found that approximately 30% of cases newly diagnosed with HBV have an imprisonment history [12]. In the present study, the seroprevalence of HBV and HCV detected in inmates in prison was (4.82%) and (0.4%), respectively, similar to that in thesociety.

In a study by Kebede et al. investigating seroprevalence of HBV and HCV in Southwest Ethiopia, the prevalence of HBV according to age groups was 2.38% (20 yo), 2.85% (21-30 yo), 4.25% (31-40 yo) and 18.80% (>40 yo). The prevalence of HCV was found as 10.7% (31-40 yo) and 6.3% (>40 yo) [13]. In a study performed by Pack et al [11], it was found that HBV, HCV and sexually transmitted diseases are seen more frequently in adolescent male inmates compared to adults. This finding was attributed to the fact that adolescent inmates do not have enough information about the protection methods against sexually transmitted diseases and that they change partners more frequently.

In our study, we do not find a significant difference between the ages of HBV and HCV- infected inmates. In Maltepe and Kartal Penal Institutions where we conducted our study, there are only adult inmates and the mean age of our participants was 31 years. The mean age of inmates who tested positive for HBV was 31 years, while the mean age of inmates who were positive for HCV was 39 years. Seroprevalence and age distribution show geographical variability due to cultural and lifestyle factors.

A study by Macalino, HBV and HCV infections were significantly associated with those who used intravenous drugs (odds ratio was 7.9 and 32.4, respectively) [14]. In another study by Treso et al., HCV positivity was found in 22.5% of prisoners who used intravenous drugs ($p<0.05$) [15]. In a study by Taleban et al., HBV positivity was found in 18% of intravenous drug users [16]. Similarly, in our study, intravenous drug use was observed in all cases with HCV infection and was found to be significant among all cases with hepatitis compared to the inmates without hepatitis ($p < 0.05$).

In the present study, there was no statistically significant difference between the hepatitis (+) and hepatitis (-) groups in terms of the other studied parameters, including age, education, and income status, marital status and number of partners, condom use, tattoo, cigarette and alcohol use and blood transfusion, consistently with the literature [17 - 20]. One of the two cases with detected HCV infection had a tattoo. However, the statistical calculation could not be performed due to insufficient numbers.

The rate of sharing of materials such as razor, nail clippers and especially a toothbrush was high. Six HBV and one HCV patient shared these materials, which is important for transmission risk in common living places.

Educational status was primary school in 70% of the inmates with hepatitis, suggesting that these cases have insufficient information on transmission ways. Similarly, in the study by Nokhodian, the majority of the participants were primary school graduates.

None of the twenty-five wardens included in our study were found to be infected with HBV and HCV. This finding conforms with the literature [19].

Crime rates and therefore the number of detainees and prisoners are gradually increasing. Prison occupancy rate is 100% depending on the city. Prison conditions are questioned and debated by the public and this situation increases the importance of the present study. Besides common living as a solely risk factor for HBV and HCV, other risky behaviors questioned in our study affect not just inmates and prison workers, but also whole society, because 96.1% of our participants will be released within the next three years.

Study Limitations

The main limitation is that this study was conducted only in Kartal and Maltepe Penal Institutions and the results should not be generalized. In addition, age groups were not taken into account in the analysis of the questionnaire. However, our number of participants is satisfying for such a cross-sectional study. Furthermore, since this study is the first on this subject in Turkey, we believe that our results will be guiding for future more comprehensive studies.

Conclusion

Our results indicate that serorevalence of HBV and HCV among prisoners was similar to the general population. However, Prisons present a high-risk environment for the transmission and amplification of several infections. Therefore, health education programs focusing on infection prevention and how to build low risk behaviors, and facilitating access to suitable treatment care, should be in place in prison settings. Training on appropriate behavioral patterns, performing required health screening, improving conditions in prisons and reaching broader data through similar studies are important not just for individual health but also for public health.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References

1. Inan N, Tabak F. Hepatitis B Virus: Biology and Life Cycle. Viral Hepat J. 2015; 21(1): 1-7.

2. Baykam N, Guner R. Epidemiology of Viral Hepatitis Changes in Our Country. Viral Hepat J. 2018;24(1):1-2.

3. Bukh J. The history of hepatitis C virus (HCV): Basic research reveals unique features in phylogeny, evolution and the viral life cycle with new perspectives for epidemic control. J Hepatol. 2016; 65(1Suppl.): S2-21.

4. Tunc N. Chronic Hepatitis C Prevalence and Physician Awareness in Southeastern Turkey. Viral Hepat J. 2019;25(3):101-4.

5. Kizilates F, Berk H, Coban M, Seyman D, Sarikaya M, Sari F, et al. Seroprevalence of hepatitis B and C virus in patients who undergo hemodialysis in Antalya province, Turkey. Asian Biomedicine. 2017; 10(4): 339-44.
6. Karaosmanoglu HK, Aydin OA, Rahsan Ince E, Emirhan Isık M, Kok M. HBV Serological Profiles and Vaccination Status among Healthcare Workers in Istanbul, Turkey. J Anc Dis Prev Rem. 2015; 3:1.
7. Dana D, Zary N, Peyman A, Behrooz A. Risk prison and hepatitis B virus infection among inmates with history of drug injection in Isfahan, Iran. Scientific World Journal. 2013; 735761.
8. Leblebicioğlu H, Eroğlu C, members of the Hepatitis Study Group. Acute hepatitis B virus infection in Turkey: epidemiology and genotype distrubition. Clin Microbiol Infect. 2004; 10(6):537-41.
9. Alter MJ. Epidemiology of hepatitis C in the West. Semin Liver Dis. 1995; 15(1): 5-14.
10. Minuk G, Sun D, Greenberg R, Zhang M, Hawkins K, Uhanova J, et al. Occult hepatitis B virus infection in North American adults Hemodialysis patient population. Hepatol. 2004; 40(5):1072-7.
11. Kaygusuz Ö. Kronik hemodiyaliz hastalarında HBsAg ve Anti-HBs prevalansı (Prevalence of HBsAg and Anti-HBs in chronic hemodialysis patients). FÜ Sağ Bil Derg 2007; 21: 55-7.
12. Kamarulzaman A, Reid SE, Schwitters A, Wiessing L, El-Bassel N, Dolan K, et al. Prevention of transmission of HIV, hepatitis B virus, hepatitis C virus, and tuberculosis in prisoners. Lancet (London, England). 2016; 388(10049): 1115–26.
13. Hammett TM, GaitorJL, Crawford C. Reaching seriously at risk populations: health interventions in criminal justice settings. Health Educ Behav. 1998; 25(1): 99-120.
14. Ruiz JD, Molitor F, Sun RK, Mikanda J, Facer M, Colford JM Jr, et al. Prevalance and correlates of hepatitis C virus infection among inmates entering the California correctional system. West J Med. 1999; 170(3): 156-60.
15. Pack RP1, Diclemente RJ, Hook EW 3rd, Oh MK. High prevalance of asymptomatic STDs in incarcerated minitory male youth: A case for screening. Sex Transm Dis. 2000; 27(3):175-7.
16. Goldstein ST, Alter MJ, Williams IT, Moyer LA, Judson FN, Mottram K, et al. Incidence and risk factors for acute hepatitis B in the US, 1982-1998: implications for vaccination programs. J Infect Dis. 2002; 185(6): 713-19.
17. Kebede W, Abdisa A, Seid Y, Mekonnen Z. Seroprevalence and risk factors of hepatitis B, hepatitis C and HIV infections among prisoners in Jimma Town, Southwest Ethiopia. Asian Pacific Journal of Tropical Disease. 2017; 7(5): 270-5.
18. Macalino GE, Vlahov D, Sanford-Colby S, Patel S, Sabin K, Salas C, et al. Prevalance and incidence of HIV, HBV, HCV infectious among males in Rhode Island Prisons. Am J Public Health. 2004; 94(7):1218-23.
19. Treso B, Barcsay E, Tarjan A, Horváth G, Dencs A, Hettmann A, et al. Prevalance and correlates of HCV, HBV and HIV infection among Prison Inmates and Stuff, Hungary. J Urban Health. 2011; 89(1):108-16.
20. Taleban R, Moafi M, Ataei B, Yaran M, Nokhodian Z, Kassaian N, et al. Seroprevalence of Hepatitis B Infection and Associated Risk Factors among Drug Users in Drop-in Centers of Isfahan, Iran. Int J Prev Med. 2018; 9: 46.

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